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Congruences of p-adic L-functions and applications to algebraic cycles

I will discuss my result establishing a congruence between the Bertolini-Darmon-Prasanna anticyclotomic p-adic L-function attached to a newform f with reducible residual p-adic Galois representation and the Katz p-adic L-function. From this, there follows a congruence between p-adic Abel-Jacobi images of certain generalized Heegner cycles and products of certain Bernoulli numbers and Euler factors. As an application, one can show that when a semistable elliptic curve $E/\mathbb{Q}$ has reducible mod 3 Galois representation, ranks 0 and 1 each occur with a positive proportion in the quadratic twist family of E, and furthermore one can give explicit families of twists with these ranks. If time permits, I will also discuss recent work with Chao Li pertaining to relationships between ranks within quadratic twist families of elliptic curves.